

(19)



JAPANESE PATENT OFFICE

## PATENT ABSTRACTS OF JAPAN

(11) Publication number: **03285358 A**  
(43) Date of publication of application: **16.12.1991**

(51) Int. Cl. **H01L 29/788**  
**H01L 27/10, H01L 27/115, H01L 29/792**

(21) Application number: <b>02087950</b>	(71) Applicant: <b>MATSUSHITA ELECTRON CORP.</b>
(22) Date of filing: <b>02.04.1990</b>	(72) Inventor: <b>KOIKE NORIO</b>

### (54) DRIVING METHOD FOR NONVOLATILE SEMICONDUCTOR STORAGE DEVICE

#### (57) Abstract:

**PURPOSE:** To improve number of rewriting times and information holding time by generating substrate hot holes for storing positive charge in a floating gate, and generating drain avalanche hot electrons for storing negative charge.

**CONSTITUTION:** A forward voltage is applied to a pn junction between a P-type semiconductor substrate in and a well 14, and holes 19 to be implanted in an n-well are generated. Simultaneously, a negative voltage is applied to an upper gate electrode 9, a source p<sup>+</sup> type region 15 and a drain p<sup>+</sup> type region 16, a depleted layer 21 is generated, energy of holes 19 is applied, and holes 20 to be implanted in a lower gate oxide film 17, i.e., substrate hot holes are generated from the n-well. Thus, positive charge is stored in a floating gate.

The region 15 is grounded, a negative high voltage is applied to the region 16, and a negative low voltage is simultaneously applied to the electrode 9 to generate drain avalanche hot electrons, thereby storing a negative voltage at the gate.

COPYRIGHT: (C)1991,JPO&Japio

